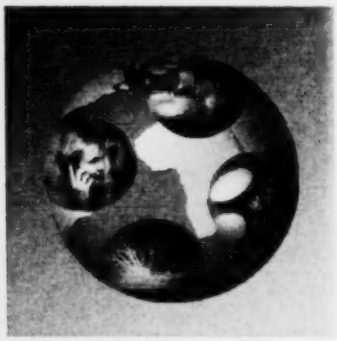
Catalogue no. 88F0006XIE — No. 003
ISSN: 1706-8967
ISBN: 978-0-662-46010-7

Working Paper

Results from the Functional Foods and Nutraceuticals Survey - 2005



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2008-02758/

Statistics Canada
Science and Technology Surveys Section
Science, Innovation and Electronic Information Division (SIEID)

Results from the Functional Foods and Nutraceuticals Survey - 2005

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May 2007

Catalogue no. 88F0006XIE, no. 003
ISSN: 1706-8967
ISBN: 978-0-662-46010-7

Frequency: occasional

Ottawa

La version française de cette publication est disponible sur demande (nº 88F0006XIF au catalogue).

Note of appreciation

Canada owes the success of its statistical system to a long-standing partnership between Statistics Canada, the citizens of Canada, its businesses, governments and other institutions. Accurate and timely statistical information could not be produced without their continued cooperation and goodwill.

The science and innovation information program

The purpose of this program is to develop **useful indicators of science and technology activity** in Canada based on a framework that ties them together into a coherent picture. To achieve the purpose, statistical indicators are being developed in five key entities:

- **Actors**: are persons and institutions engaged in S&T activities. Measures include distinguishing R&D performers, identifying universities that license their technologies, and determining the field of study of graduates.
- **Activities**: include the creation, transmission or use of S&T knowledge including research and development, innovation, and use of technologies.
- **Linkages**: are the means by which S&T knowledge is transferred among actors. Measures include the flow of graduates to industries, the licensing of a university's technology to a company, co-authorship of scientific papers, the source of ideas for innovation in industry.
- **Outcomes**: are the medium-term consequences of activities. An outcome of an innovation in a firm may be more highly skilled jobs. An outcome of a firm adopting a new technology may be a greater market share for that firm.
- **Impacts**: are the longer-term consequences of activities, linkages and outcomes. Wireless telephony is the result of many activities, linkages and outcomes. It has wide-ranging economic and social impacts such as increased connectedness.

The development of these indicators and their further elaboration is being done at Statistics Canada, in collaboration with other government departments and agencies, and a network of contractors.

Prior to the start of this work, the ongoing measurements of S&T activities were limited to the investment of money and human resources in research and development (R&D). For governments, there were also measures of related scientific activity (RSA) such as surveys and routine testing. These measures presented a limited picture of science and technology in Canada. More measures were needed to improve the picture.

Innovation makes firms competitive and we are continuing with our efforts to understand the characteristics of innovative and non-innovative firms, especially in the service sector that dominates the Canadian Economy. The capacity to innovate resides in people and measures are being developed of the characteristics of people in those industries that lead science and technology activity. In these same industries, measures are being made of the creation and the loss of jobs as part of understanding the impact of technological change.

The federal government is a principal player in science and technology in which it invests over five billion dollars each year. In the past, it has been possible to say only *how much* the federal government spends and *where* it spends it. Our report Federal Scientific Activities, 1998 (Cat. No. 88-204) first published socio-economic objectives indicators to show *what* the S&T money is spent on. As well as offering a basis for a public debate on the priorities of government spending, all of this information has been used to provide a context for performance reports of individual departments and agencies.

As of April 1999, the Program has been established as a part of Statistics Canada's Science, Innovation and Electronic Information Division.

The final version of the framework that guides the future elaboration of indicators was published in December, 1998 **(Science and Technology Activities and Impacts: A Framework for a Statistical Information System,** Cat. No. 88-522). The framework has given rise to **A Five-Year Strategic Plan for the Development of an Information System for Science and Technology** (Cat. No. 88-523).

It is now possible to report on the Canadian system on science and technology and show the role of the federal government in that system.

Our working papers and research papers are available at no cost on the Statistics Canada Internet site at http://www.statcan.ca/cgi-bin/downpub/research.cgi?subject=193.

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Highlights

- 389 firms were active in the field of functional foods and nutraceuticals (FFN). Of these, 118 firms produced functional foods products, 174 firms produced nutraceuticals products and 97 firms produced products in both fields.
- Total FFN revenue was $2.9 billion in 2004, of which $823 million came from firms producing functional foods, $1.6 billion from firms producing nutraceuticals, and $442 million from firms producing both.
- Exports of FFN products amounted to $545 million in 2004, with the majority originating from nutraceutical firms ($356 million). The most common destination for exporters was the United States.
- A total of 12,872 employees had FFN related duties.
- 74 FFN firms indicated that they have unfilled positions for FFN employees.
- R&D expenditures on FFN products amounted to $75 million.
- 95 firms attempted to raise capital for FFN purposes in 2004. Of these, 73 were successful, raising a total of $206 million.
- Wholesalers were the most commonly used distribution channel, with 238 firms indicating such use. Direct selling to other companies was the second most common channel, with 185 companies indicating use.
- 136 firms developed trade secrets, 136 firms registered trademarks and 64 firms held patents in 2004.
- The US patent office accounted for the majority of existing patents or patents pending registered by FFN firms in Canada.
- Firms indicated that there were 9,715 FFN product lines on the market, with 6,327 products from nutraceutical firms.
- The number of FFN firms, FFN revenues and FFN exports all saw notable increases over 2002 figures.

Table 1 Overview of the functional food and nutraceutical (FFN) sector

	Functional food firms	Nutraceutical firms	Firms active in both fields	Total
	number			
FFN firms	118	174	97	**389**
FFN employment	4,024	6,471	2,377	**12,872**
	thousands of dollars			
FFN revenue	823,914	1,619,874	442,749	**2,886,538**
FFN exports	107,392	356,195	81,426	**545,013**
FFN research and development (R&D)	21,186	29,831	23,537	**74,554**

Notes: Preliminary data, subject to revision. Fields may not add up to total due to rounding.
Source: Statistics Canada, The Functional Foods and Nutraceuticals Survey - 2005

1. What are functional foods and nutraceuticals?

There is no universally accepted definition for the terms functional foods, nor for the term nutraceuticals.

According to Health Canada, a *nutraceutical*

> is a product isolated or purified from foods that is generally sold in medicinal forms not usually associated with foods. A nutraceutical is demonstrated to have a physiological benefit or provide protection against chronic disease.[1]

Examples include beta-glucan from oats, essential fatty acids from marine or vegetable oil, fish oils and ginseng.

Similarly, a *functional food*

> is similar in appearance to, or may be, a conventional food that is consumed as part of a usual diet, and is demonstrated to have physiological benefits and/or reduce the risk of chronic disease beyond basic nutritional functions.[2]

Examples of functional foods include fruit juice with calcium, yogurts with probiotics, and omega-3 eggs, milk and meat.

This working paper will show results from the Functional Foods and Nutraceuticals Survey undertaken in 2005 to collect data for the year 2004.

1. Health Canada. 1998 "Nutraceuticals/functional foods and health claims on foods." Therapeutic Products Programme and the Food Directorate from the Health Protection Branch. Section 2.2 (accessed December 4, 2006).
2. Ibid.

2. Sector Profile

2.1 Revenue

Results from the survey show that revenue for FFN firms was $2.9 billion in the year 2004 (Table 2). Within the sector, firms have been broken down into three sub-sectors: those which produced functional food products, those which produced nutraceutical products, and those which produced both. These firms did not exclusively sell FFN products and had other product lines. Functional food firms[3] had FFN revenues of $823.9 million, while $1.6 billion came from nutraceutical firms. The remaining $442.7 million came from firms that produced products in both fields.

Functional foods were a relatively minor component of total sales for functional food firms. Total sales were over $18 billion, of which FFN products accounted for $824 million.

Nutraceutical firms had total revenues of $2.8 billion. Nutraceutical products were therefore 57% of sales.

These findings suggest a major difference between functional food firms and nutraceutical firms. FFN products were a minor component of overall sales for functional food firms, while nutraceutical firms derived a majority of their sales from FFN products.

Table 2 Revenue of functional food and nutraceutical firms (FFN) in 2004

	Functional food firms	Nutraceutical firms	Firms selling both	**All firms**
	thousands of dollars			
Total sales	18,187,221	2,832,483	6,675,434 [E 4]	**27,695,138**
FFN sales	823,914	1,619,874	442,749	**8,886,538**

Note: Preliminary data, subject to revision.
Source: Statistics Canada, The Functional Foods and Nutraceuticals Survey - 2005.

3. For the purposes of this report, firms that produced functional foods will be termed *functional food firms*. Firms producing nutraceutical products will be termed *nutraceutical firms*. The majority of these firms also produced other non-FFN products.

4. The symbol E indicates a coefficient of variation (CV) between 35.0% and 49.9%. When the figure is not accompanied by a symbol, the CV is less than 35.0%. When the CV is higher than 50.0%, the figure will be replaced by the symbol F. Any data highlighted with an E should be used with caution, while any data with an F has been suppressed.

2.2 Number of firms

The survey found that there were 389 firms dealing with either functional foods or nutraceuticals or both (Table 3). Of this number, 118 dealt with functional foods, 174 with nutraceuticals and 97 were active in both areas.

Table 3 Firms active in each field

	Functional food firms	Nutraceutical firms	Both functional foods and nutraceuticals	**All firms**
	number			
Total firms	**118**	**174**	**97**	**389**
Foods and beverages fortified beyond the mandatory requirement to enrich certain foods	42	...	60	**102**
Foods and beverages that have added active ingredients, excluding vitamins or minerals	44	...	76	**120**
Foods and beverages specially enhanced to contain more of a functional component	33	...	31	**63**
Nutraceuticals that are extracted or purified from plants	...	96	65	**161**
Nutraceuticals that are ground, dried, powdered and pressed from plant materials	...	93	54	**147**
Nutraceuticals that are produced, extracted or purified from animals or micro-organisms	...	75	54	**129**
Nutraceuticals that are produced, extracted or purified from marine sources	...	92	47	**138**
Nutraceuticals comprised solely of vitamins and minerals	...	60	34	**93**
Other	31	30	8	**68**

Notes: Preliminary data, subject to revision. Firms may be active in more than one field.
Source: Statistics Canada, The Functional Foods and Nutraceuticals Survey - 2005.

Most functional food firms (85%) performed research and development (R&D) (Table 4), while a majority (66%) of nutraceutical firms also performed R&D (see table 5). Half of functional food firms and half of firms that sold both products had wholesale operations, while two thirds of nutraceutical firms had wholesale operations.

Of surveyed firms, 30% of nutraceutical firms possessed retailing operations, as opposed to 44% of functional food firms.

Table 4 Firms by type of participation in the field of functional foods

	Functional food firms	Firms selling both	All firms
	number		
Scientific research and development (R&D)	100	59	158
Product development or scale up of new products	71	56	128
Manufacturer of ingredients	27	19	46
Manufacturer of consumer ready products	67	29	96
Wholesaler of products	60	50	110
Retailer of products	52	23	75
Provide services only for the industry	4	15	19
Provide technology pertaining to the production of functional foods	10	16	26
Other	10	5	16

Notes: Preliminary data, subject to revision. Totals may not add up due to rounding.
Source: Statistics Canada, The Functional Foods and Nutraceuticals Survey - 2005.

Table 5 Firms by type of participation in the field of nutraceuticals

	Nutraceutical firms	Firms selling both	All firms
	number		
Scientific research and development (R&D)	115	62	177
Product development or scale up of new products	86	63	149
Manufacturer of ingredients	60	28	88
Manufacturer of consumer ready products	65	32	97
Wholesaler of products	115	46	161
Retailer of products	52	24	77
Provide services only for the industry	9	16	25
Provide technology pertaining to the production of nutraceuticals	12	20	32
Other	11	5	16

Note: Preliminary data, subject to revision.
Source: Statistics Canada, The Functional Foods and Nutraceuticals Survey - 2005.

2.3 Exports

Total FFN exports amounted to $545 million, which was 41% of total exports and 19% of FFN sales (Table 6). The bulk of these exports came from nutraceutical firms, which exported $356 million worth of products, over three times the amount exported by functional food firms.

For nutraceutical firms, nutraceutical products accounted for 70% of their export revenue and 13% of their total sales.

Firms specializing in functional foods, however, did not see the same level of concentration. Functional food exports accounted for only 21% of export revenues, and less than 1% of total revenue. While figures may vary among individual firms, overall the level of importance was not as high as it was for the nutraceutical sector. Firms that had both functional food and nutraceutical products had the same characteristics as functional food firms.

Table 6 Total and Functional Foods and Nutraceuticals (FFN) Exports

	Functional food firms	Nutraceutical firms	Firms selling both	**All firms**
	thousands of dollars			
Total exports	522,663	507,393	307,921	**1,337,977**
FFN exports	107,392	356,195	81,426	**545,013**

Note: Preliminary data, subject to revision.
Source: Statistics Canada, The Functional Foods and Nutraceuticals Survey - 2005.

Not surprisingly, nearly half of all firms stated that they exported products to the United States, while roughly 10% exported to Korea and another 10% exported to Japan (Table 7). One third of exporters exported to other destinations. Firms were able to indicate that they exported to more than one destination.

Table 7 Firms exporting products and services and destination

	Functional food firms	Nutraceutical firms	Firms selling both	**All firms**
	number			
United States	67	73	46	**186**
Korea	5	20	10	**35**
Japan	5	29	12	**46**
Other	30	81	33	**144**

Notes: Preliminary data, subject to revision. Firms may be exporting to more than one market.
Source: Statistics Canada, The Functional Foods and Nutraceuticals Survey - 2005.

While the survey results indicated that the United States was a major market for exports, 25% of firms indicated that they were actively investigating new export markets that did not include the United States, Japan or Korea (Table 8). This indicates a keen interest in expanding export destinations for Canadian FFN products.

Table 8 Firms actively investigating new export markets over the next two years, by country of future exports

	Functional food firms	Nutraceutical firms	Firms selling both	All firms
	number			
United States	5 [E]	10	6	**22**
Korea	6	6	0	**12**
Japan	9	14	6 [E]	**29**
Other	27	50	20	**97**

Notes: Preliminary data, subject to revision. Firms may be investigating more than one market. Number of firms may not sum up individual components due to rounding of estimates.
Source: Statistics Canada, The Functional Foods and Nutraceuticals Survey - 2005.

2.4 Employment

FFN firms employed 51,685 individuals in 2004 (Table 9). Of these employees, 12,872 had FFN related duties. Half of these employees were employed by nutraceutical firms (6,471) while 4,024 were employed by functional foods firms and 2,377 by firms active in both fields. Not surprisingly, in light of the importance of nutraceutical products for nutraceutical firms, 49% of employees in nutraceutical firms had nutraceutical related duties. On the other hand, only 12% of employees in functional food firms had functional food related duties. An interesting note is that the majority of employees (55%) in firms selling both products had FFN related duties.

Table 9 All employees (including permanent, seasonal, casual or contract) and employees with functional food and nutraceuticals (FFN) related duties

	Functional food firms	Nutraceutical firms	Firms selling both	All firms
	number			
All employees	34,033	13,341	4,311	**51,685**
Employees with FFN related duties	4,024	6,471	2,377	**12,872**

Note: Preliminary data, subject to revision.
Source: Statistics Canada, The Functional Foods and Nutraceuticals Survey - 2005.

Many firms indicated that they had unfilled FFN positions (Table 10). This was most noticeable for nutraceutical firms, where 26% of respondents indicated unfilled positions. These positions tend to be in the fields of intellectual property, market research and quality control. Dual product firms also indicated issues in recruitment, again with quality control being an issue. Firms specializing in functional foods did not indicate as many issues with unfilled positions.

Table 10 Firms with unfilled positions and types of positions which they are actively seeking to fill

	Functional food firms	Nutraceutical firms	Firms selling both	All firms
	number			
Total firms with unfilled positions	**11**	**45**	**19**	**74**
Scientific R&D	0	5	3 [E]	8
Technical or engineering	F	8	6	15
Regulatory	0	3 [E]	0	3 [E]
Intellectual property	7	16	6	30
Manufacturing or production	F	12	4 [E]	18
Sales, marketing or advertising	0	12	7	20
Clinical affairs	0	x	x [E]	9
Market research	3 [E]	19	4 [E]	26
Quality control	F	24	11	36
Management or finance	0	F	5	6
Business development	0	F	0	F
Other	7	17	4	28

Notes: Preliminary data, subject to revision. Number of firms may not sum up individual components due to rounding of estimates. Firms may have unfilled positions in more than one area.
Source: Statistics Canada, The Functional Foods and Nutraceuticals Survey - 2005.

A question arises as to why nutraceutical firms had difficulties in filling positions (Table 11). Three main issues stand out: compensation demands exceeded offers, candidates lacked experience, and the high level of competition for the candidates who were searching for employment.

Table 11 Firms indicating obstacles that impacted efforts to fill positions

	Functional food firms	Nutraceutical firms	Firms selling both	All firms
	number			
Compensation requirements by candidates too high	8	19	9	35
Candidates unwilling to relocate	0	x	x	9
Candidates lack of expertise	0	19	12	31
Capital or resources insufficient to attract candidates	3	15	9	28
Competition for qualified candidates	8	18	8	34
Other	6	8	0	14

Notes: Number of firms may not sum up individual components due to rounding of estimates. Firms may have indicated more than one reason.
Source: Statistics Canada, The Functional Foods and Nutraceuticals Survey - 2005.

2.5 Research and Development

R&D spending by all firms amounted to $162.8 million (Table 12). Of this spending, $74.5 million was spent on FFN products. Nutraceutical products accounted for the largest share of this spending at $29.8 million. What is interesting to note is that nutraceutical firms spent a total of $76 million on R&D, so that the majority of their total R&D spending was not on nutraceutical products.

Table 12 Research and development (R&D) expenditures by functional food and nutraceuticals (FFN) firms in 2004

	Functional food firms	Nutraceutical firms	Firms selling both	All firms
	thousands of dollars			
Total R&D spending	45,612	76,190	41,063	**162,865**
Total FFN R&D	21,186	29,831	23,537	**74,554**

Note: Preliminary data, subject to revision.
Source: Statistics Canada, The Functional Foods and Nutraceuticals Survey - 2005.

2.6 Financing

In 2004, this sector raised a total of $206 million of capital for FFN purposes (Table 13). The majority of these funds were raised by firms that provided both functional foods and nutraceuticals.

Table 13 Firms that attempted to raise capital for functional food and nutraceutical (FFN) purposes

	Functional food firms	Nutraceutical firms	Firms selling both	All firms
	number			
Firms that attempted to raise capital	31	33	31	**95**
Firms that were successful in raising capital	24	26	23	**73**
	thousands of dollars			
Total amount of capital raised	23,991	40,178	142,272	**206,441**

Note: Preliminary data, subject to revision.
Source: Statistics Canada, The Functional Foods and Nutraceuticals Survey - 2005.

The main source of funds for all industries was the government, with 29 firms having received government funding (Table 14). Other notable sources were angel investors, Canadian venture capitalists and conventional sources, such as banks and initial public offerings (IPOs).

Table 14 Sources of capital

	Functional food firms	Nutraceutical firms	Firms selling both	All firms
	number			
Canadian based venture capital	x	9	x	**16**
American based venture capital	4	0	0	**4**
Other foreign based venture capital	x	0	4	**6**
Conventional sources (banks, initial public offering)	5	8	4	**17**
Angel investors and/or family	6	7	3 E	**17**
Government sources	11	8	10	**29**
Partner(s) from strategic alliances	F	F	5	**8**
Other	x	F	10	**15**

Notes: Preliminary data, subject to revision. Number of firms may not sum up individual components due to rounding of estimates. Firms may have multiple sources of capital.
Source: Statistics Canada, The Functional Foods and Nutraceuticals Survey - 2005.

3. Aggregate comparison with 2002 data

A comparison between totals for the FFN sector in 2002 and 2004 show a significant across the board increase in all major variables. As can be seen in Table 15, there was growth in the number of firms, FFN revenues, exports and R&D expenditures and the amount of capital raised for FFN purposes.

Table 15 A comparison of key comparable indicators between 2002 and 2004 data

	2002	2004	Percentage increase
	number		
Firms	294	389	32
Firms which raised capital for FFN purposes	61	73	20
	thousands of dollars		
FFN revenues	2,500,000	2,887,000	15
FFN Exports	382,000	545,000	43
R&D expenditures on FFN products	57,800	74,600	29
Capital raised for FFN purposes	67,000	206,000	207

Note: Preliminary data, subject to revision.
Source: Statistics Canada, The Functional Foods and Nutraceuticals Survey – 2003 and 2005.

4. Firm Characteristics

4.1 Activities

The majority of firms produced finished goods for foreign or domestic markets, with the next major product category being raw materials (Table 16).

The main category of goods produced was finished products to be sold by wholesalers or retailers. Forty one percent of firms produced finished goods for export, while 35% produced finished goods for domestic consumption. There was little difference between companies producing functional foods, nutraceuticals or both: around 40 percent of firms produced finished goods for export and around one third produced goods for domestic consumption.

What is noticeable is that very few (9%) functional food firms produced semi-finished goods for further processing.

Table 16 Firms with functional food or nutraceutical (FFN) activities, indicating types of goods or services and markets

	Functional food firms		Nutraceutical firms		Firms selling both		All firms	
	number							
Raw material or ingredients to be used in functional foods or nutraceuticals	18	16	48	42	13	19	**79**	**77**
Semi-finished functional foods or nutraceuticals to be further processed before sale	10	6	28	23	12	16	**51**	**45**
Finished functional foods or nutraceuticals to be sold at the wholesale or retail level without further processing	53	40	71	59	37	38	**161**	**137**
Technology pertaining to the production of functional foods or nutraceuticals	x	3 [E]	x	5 [E]	10	10	**16**	**18**
Scientific research and development (R&D)	12	9	13	17	12	18	**37**	**44**
Equipment, clinical testing, software or regulatory affairs for the FFN industry	x	0	x	x	4	8	**6**	**12**
Other	F	F	x	x	x	x	**3** [E]	**3** [E]

Notes: Preliminary data, subject to revision. Number of firms may not sum up individual components due to rounding of estimates. Firms may be active in more than one field.
Source: Statistics Canada, The Functional Food and Nutraceuticals Survey – 2005.

4.2 Distribution channels

Major distribution channels used by all firms include retailers, wholesalers, the internet, direct selling to other firms, brokerage and third party sellers and direct selling to customers (Table 17). Wholesalers were used by 61% of firms, while half of companies used direct selling to other companies.

A major difference between nutraceutical firms and functional food firms was in their choice of distribution channels. Seventy percent of nutraceutical firms used wholesalers while only 31% used retailers. In comparison, half of functional food firms used wholesalers and 45% used retailers. It appears that a greater number of functional food firms had a direct relationship with retailers, while nutraceutical firms were much more dependent upon intermediaries (wholesalers) to distribute their product.

At the same time, half of functional food firms sold to brokers or third party distributors, while only 16% of nutraceutical firms did so. Nearly a quarter of all firms indicated that they sold direct to the customer.

What is interesting is that while less than 10% of functional food firms and 10% of nutraceutical firms sold using the internet, 20% of firms that sold both types of products used the internet. Thirty percent of firms selling both products also indicated that they used other distribution channels not within the list.

Table 17 Firms which used various distribution channels for functional foods and nutraceuticals (FFN)

	Functional food firms	Nutraceutical firms	Firms selling both	All firms
	number			
Direct selling to final consumer	31	40	19	**89**
Internet sales	10	17	20	**48**
Retailer	54	54	26	**134**
Wholesaler	60	121	57	**238**
Mail order	10	13	9	**33**
Multi-level marketing or network marketing	6	4 [E]	8	**17**
Broker or third party distributor	57	28	34	**118**
Direct selling to other companies	54	88	43	**185**
Other	19	17	30	**67**

Note: Preliminary data, subject to revision. Number of firms may not sum up individual components due to rounding of estimates. Firms may have used more than one channel.
Source: Statistics Canada, The Functional Foods and Nutraceuticals Survey - 2005.

4.3 Partnership agreements and contracting out

Around 40% of firms stated that they had partnership agreements (Table 18). This was consistent whether firms produced functional foods, nutraceuticals or both. Furthermore, approximately 75% of partnerships were with other Canadian based firms (Table 19).

An area where there was a difference was in partnerships with American based firms. While 54% of functional food firms stated that they had a partnership with an American firm, only 38% of nutraceutical firms stated that they too had such a partnership. Forty-four percent of companies with both product types had American partnerships.

Nearly half of all firms were actively seeking partnership agreements. There were three main purposes indicated by respondents for which partnerships had been established: to conduct R&D (21%), for production or marketing (23%) and to access markets or distribution channels (18%). These figures are consistent across firm type.

Table 18 Firms with partnership arrangements and type of arrangement

	Functional food firms	Nutraceutical firms	Firms selling both	All firms
	number			
All firms with partnership arrangements	**52**	**61**	**39**	**151**
Purpose				
To conduct research and development (R&D)	26	29	26	**81**
Regulatory affairs	9	6	4	**19**
Access others' patents	x	x	x	**17**
Production or manufacturing	30	33	27	**90**
Access markets or distribution channels	19	33	16	**68**
Access capital	6	3 E	5	**14**
Access to intellectual property of partners	9	16	5	**31**
Other	x	x	x	**10**

Notes: Preliminary data, subject to revision. Number of firms may not sum up individual components due to rounding of estimates. Firms may have more than one type of partnership arrangement.
Source: Statistics Canada, The Functional Foods and Nutraceuticals Survey - 2005.

Table 19 Firms with partnership arrangements by location of partner

	Functional food firms	Nutraceutical firms	Firms selling both	All firms
	number			
All firms with partnership arrangements	**52**	**61**	**39**	**151**
Location of partner				
Canadian based companies or organizations	40	44	30	**114**
American based companies or organizations	28	23	17	**68**
Other foreign based companies or organizations	11	18	14	**44**

Notes: Preliminary data, subject to revision. Number of firms ay not sum up individual components due to rounding of estimates. Firms may have more than one type of partnership arrangement.
Source: Statistics Canada, The Functional Foods and Nutraceuticals Survey - 2005.

Contracting out of activities was also a very significant activity for these firms (Table 20). Half of nutraceutical firms contracted out work, usually for market research purposes. On the other hand, only 22% of functional food firms contracted out work. Firms in both fields also sought market research assistance. Roughly fifteen percent of all firms contracted out intellectual property work.

Table 20 Firms indicating that they contacted out functional food and nutraceutical (FFN) activities and purpose

	Functional food firms	Nutraceutical firms	Firms selling both	All firms
	number			
Firms that have contracted out	**26**	**88**	**35**	**149**
Purpose				
R&D	5	4 [E]	0	**9**
Technical or engineering	4 [E]	4	5	**13**
Regulatory	4	3 [E]	F	**9**
Intellectual property	16	27	13	**57**
Manufacturing or production	x	9	x	**20**
Sales, marketing or advertising	12	20	9	**41**
Clinical affairs	4 [E]	5	6	**15**
Market research	12	65	28	**106**
Quality control	9	15	5	**29**
Management or finance	x	9	x	**14**
Business development	8	11	7	**25**
Other	3 [E]	33	7	**43**

Notes: Preliminary data, subject to revision. Number of firms may not sum up individual components due to rounding of estimates. Firms may have contracted out for more than one purpose.
Source: Statistics Canada, The Functional Foods and Nutraceuticals Survey - 2005.

4.4 Intellectual property

Roughly one third of firms in each field indicated that they had developed trade secrets or had registered trademarks in 2004 (Table 21). The vast majority of firms (83.6%) did not have patents, but for the firms that did, 298 patents had been granted, and 828 patents were pending (Table 22). The location of their patents tended to be with the United States Patent and Trademark Office, where 423 patents (or one third of the total) had been registered. 16% of patents were registered at the Canadian Intellectual Property Office, another 11% at the European Union patent office while the rest were registered in other jurisdictions.

Table 21 Firms that developed intellectual property in 2004

	Functional food firms	Nutraceutical firms	Firms selling both	**All firms**
	number			
Developed trade secrets	38	54	44	**136**
Firms that registered trademarks in 2004	41	55	40	**136**
Firms with patents or patents pending in 2004	5	35	23	**64**

Note: Preliminary data, subject to revision.
Source: Statistics Canada, The Functional Foods and Nutraceuticals Survey - 2005.

Table 22 Functional food or nutraceutical patents and patents pending, by patent office

	Canadian intellectual property office (CIPO)	US patent and trademark office (USPTO)	European patent office	Other
	number			
Functional food firms				
Existing patents	x	8 E	36 E	16 E
Pending patents	29 E	70 E	29 E	188 E
Nutraceutical firms				
Existing patents	17	97	20	25
Pending patents	85	120	38	100
Firms active in both				
Existing patents	x	39	15	9 E
Pending patents	19	89	21	40 E
All firms				
Existing patents	33	144	71	50
Pending patents	133	279	88	328

Note: Preliminary data, subject to revision.
Source: Statistics Canada. The Functional Foods and Nutraceuticals Survey - 2005.

5. Impact of regulations

5.1 Allowable health claims on functional foods

In 2003, Health Canada authorized the use of five generic health claims which pertain to: sodium, potassium and hypertension; calcium, vitamin D and osteoporosis; saturated fat, trans fat and cholesterol and coronary heart disease; fruits and vegetables and some types of cancers; and sugar alcohols and dental caries. The framework for the authorization of health claims for foods in Canada distinguishes between generic claims and product-specific claims. Generic health claims can be nutrition function claims or "disease risk-reduction" claims made on a general food type or nutrient.

Nearly half of all functional food firms (43%) stated that the ability to use the five generic health claims had a positive impact on domestic sales, while 45% of functional food firms stated that this ability was positive in developing new products (Table 23). Fourteen percent of these firms indicated no impact on domestic sales.

Generic health claims had a lesser effect on export sales, with only 30% of firms stating a positive impact, 23% stating no impact and 47% stating that they did not know.

Nutraceutical firms tended to state that there was either no impact or that they didn't know the impact of these generic health claims.

Table 23 Firms indicating impact of the ability to use allowable health claims on functional foods

	Functional food firms				Nutraceutical firms			
	Negative	Positive	No impact	Don't know	Negative	Positive	No impact	Don't know
	percentage							
Domestic sales	6	43	14	37	7	24	25	44
Export sales	0	30	23	47	2	21	31	46
Conducting research to support health claims on existing products	4	23	22	50	6	21	27	45
Competing with global competitors	5	31	21	44	6	17	30	46
Commercializing new products	5	38	16	40	11	19	24	45
Developing new products	6	45	16	32	12	20	23	45

Table 23.1 Firms indicating impact of the ability to use allowable health claims on functional foods

	Firms selling both				**All firms**			
	Negative	Positive	No impact	Don't know	Negative	Positive	No impact	Don't know
	percentage							
Domestic sales	20	28	26	27	**10**	**31**	**22**	**38**
Export sales	6	27	35	32	**2**	**25**	**30**	**43**
Conducting research to support health claims on existing products	20	30	32	20	**9**	**24**	**27**	**41**
Competing with global competitors	19	16	42	23	**9**	**22**	**30**	**40**
Commercializing new products	25	29	23	23	**13**	**28**	**21**	**38**
Developing new products	23	35	28	15	**13**	**32**	**22**	**34**

Note: Percentages may not add up to 100% due to rounding.
Source: Statistics Canada, The Functional Foods and Nutraceuticals Survey - 2005.

5.2 Claims on nutraceuticals under the Natural Health Products Regulations

On January 1, 2004, Health Canada authorized the Natural Health Products Regulations (under the Food and Drug Act), which include provisions on: product licensing, site licensing, good manufacturing practices, adverse reaction reporting, clinical trials labelling, and provisions for a full range of health claims that will be supported by evidence. Products that fall within these regulations include herbal remedies, homeopathic medicines, vitamins, minerals, traditional medicines, probiotics, amino acids and essential fatty acids.

Similar to results seen in section 5.1, the effect of the ability to make claims on nutraceuticals was viewed as a positive effect on domestic sales by 41% of nutraceutical firms, while only 22% stated that there had been a positive effect on export sales (Table 24). At the same time, 23% of nutraceutical firms stated there had been no impact on domestic sales and 24% stated that they did not know the effects, 31% stated there had been no impact on export sales and 41% stated that they didn't know what the impact had been on export sales.

Furthermore, 39% of nutraceutical firms stated that the ability to make claims had a positive impact on the development of new products and 37% of nutraceutical firms stated a positive impact on the commercialization of new products.

It would appear that the ability to make claims on nutraceuticals under the Natural Health Products Regulations was viewed as having more of positive effect on domestic sales and product development than on export sales, where the effects were much less.

Table 24 Firms indicating impact of the ability to make claims on nutraceuticals under the Natural Heath Products Regulations

	Functional food firms				Nutraceutical firms			
	Negative	Positive	No impact	Don't know	Negative	Positive	No impact	Don't know
	percentage							
Domestic sales	4	11	14	70	11	41	23	24
Export sales	2	10	18	70	6	22	31	41
Conducting research to support health claims on existing products	4	12	14	70	16	31	26	24
Competing with global competitors	4	7	16	73	13	24	39	24
Commercializing new products	4	10	13	73	21	37	20	25
Developing new products	4	12	13	70	19	39	22	21

Table 24.1 Firms indicating impact of the ability to make claims on nutraceuticals under the Natural Health Products Regulations

	Firms selling both				**All firms**			
	Negative	Positive	No impact	Don't know	Negative	Positive	No impact	Don't know
	percentage							
Domestic sales	23	30	14	34	**12**	**29**	**16**	**42**
Export sales	11	26	31	41	**6**	**19**	**29**	**46**
Conducting research to support health claims on existing products	17	32	22	30	**13**	**25**	**21**	**41**
Competing with global competitors	12	25	26	36	**11**	**19**	**26**	**44**
Commercializing new products	23	32	14	29	**17**	**27**	**15**	**41**
Developing new products	24	34	10	32	**16**	**30**	**14**	**41**

Notes: Preliminary data, subject to revision. Percentages may not add up to 100% due to rounding.
Source: Statistics Canada, The Functional Foods and Nutraceuticals Survey - 2005.

5.3 Novel food regulations for functional foods

Novel foods are: foods resulting from a process not previously used for food; products that have never been used as a food; or foods that have been modified by genetic manipulation, also known as genetically modified (GM) foods, genetically engineered foods or biotechnology-derived foods. Health Canada has established science-based regulations, guidelines and public health policies for novel foods to assess the safety of these products for Canadians, animals and the environment.

Novel food regulations were viewed as having little impact, with more than half of all firms saying that they had no impact or that they did not know across most variables (Table 25). The rest of the respondents were split between both positive and negative, with little differentiation by firm type.

Overall, the use of allowable health claims on functional foods was viewed as having a positive impact by a greater proportion of firms than novel food regulations. Half of functional food firms and half of nutraceutical firms stated that they didn't know what the impact was of novel food regulations.

Table 25 Firms indicating impact of novel food regulations for functional foods on business

	Functional food firms				Nutraceutical firms			
	Negative	Positive	No impact	Don't know	Negative	Positive	No impact	Don't know
	percentage							
Domestic sales	21	22	18	38	10	11	26	53
Export sales	5	19	29	47	2	11	32	55
Conducting research to support health claims on existing products	10	12	27	51	6	16	25	52
Competing with global competitors	18	14	21	47	7	12	29	52
Commercializing new products	16	25	19	39	7	14	28	52
Developing new products	15	26	21	39	10	17	23	50

Table 25.1 Firms indicating impact of novel food regulations for functional foods on business

	Firms selling both				**All firms**			
	Negative	Positive	No impact	Don't know	Negative	Positive	No impact	Don't know
	percentage							
Domestic sales	22	18	26	34	**16**	**16**	**23**	**44**
Export sales	11	12	44	34	**5**	**13**	**34**	**47**
Conducting research to support health claims on existing products	16	27	30	27	**10**	**17**	**27**	**46**
Competing with global competitors	17	15	36	32	**13**	**13**	**28**	**45**
Commercializing new products	25	15	29	31	**14**	**18**	**25**	**43**
Developing new products	22	19	29	30	**14**	**20**	**24**	**42**

Notes: Preliminary data, subject to revision. Percentages may not add up to 100% due to rounding.
Source: Statistics Canada, The Functional Foods and Nutraceuticals Survey - 2005.

5.4 Using product specific claims in the future

Product-specific claims are associated with a specific food which has demonstrated a measurable health benefit beyond normal body function, growth, development or maintenance of good health. This type of claim relates to a health effect of a specific product rather than a general food type or nutrient. Under existing regulations, Canada does not have a regulatory framework to authorize product-specific claims.

The ability to use product-specific claims in the future was cited as being beneficial by the majority of respondents for every category except export sales of functional foods (Table 26).

Table 26 Firms indicating impact of the ability to use product specific claims in the future

	Functional food firms				Nutraceutical firms			
	Negative	Positive	No impact	Don't know	Negative	Positive	No impact	Don't know
	percentage							
Domestic sales	2	70	8	19	4	64	8	24
Export sales	0	53	20	27	3	35	27	35
Conducting research to support health claims on existing products	0	44	15	41	4	54	16	27
Competing with global competitors	0	52	16	32	5	44	21	30
Commercializing new products	0	62	12	26	6	61	9	25
Developing new products	2	62	10	25	8	60	8	25

Table 26.1 Firms indicating impact of the ability to use product specific claims in the future

	Firms selling both				**All firms**			
	Negative	Positive	No impact	Don't know	Negative	Positive	No impact	Don't know
	percentage							
Domestic sales	2	77	6	15	**4**	**69**	**7**	**20**
Export sales	0	54	20	27	**1**	**45**	**23**	**31**
Conducting research to support health claims on existing products	1	63	20	16	**2**	**53**	**17**	**29**
Competing with global competitors	2	57	24	18	**2**	**49**	**20**	**28**
Commercializing new products	2	70	12	15	**3**	**63**	**11**	**23**
Developing new products	2	74	12	12	**5**	**64**	**10**	**22**

Notes: Preliminary data, subject to revision. Percentages may not add up to 100% due to rounding.
Source: Statistics Canada, The Functional Foods and Nutraceuticals Survey - 2005.

6. Products

6.1 Number of products

There were 9,175 FFN products on the market in the year 2004 (Table 27). Nutraceutical firms accounted for the bulk of these with 6,327 products. The 2,180 products sold by firms active in both fields include both functional food and nutraceutical products. It would appear that nutraceutical firms tended to have more FFN products per firm than functional food only firms (see table 27).

Table 27 Functional food or nutraceutical (FFN) product lines on the market

	Functional food firms	Nutraceutical firms	Firms selling both	**All firms**
	number			
FFN product lines on the market	1,209	6,327	2,180 [E]	**9,715**

Notes: Preliminary data, subject to revision. Total number of product lines may not sum up individual components due to rounding of estimates.
Source: Statistics Canada, The Functional Foods and Nutraceuticals Survey - 2005.

6.2 Product Area

A large number of functional food firms provided products in three main areas: vascular health, energy and general nutrition (Table 28). General nutrition products were provided by half of all functional food firms. While general health was roughly as important to nutraceutical firms, with energy and vascular health products also being offered, one third of nutraceutical firms also offered products for gut health, bone health and the immune system. This arose due to the fact that firms specializing in nutraceuticals tended to have a wider product line than functional food firms.

Firms that provided both functional foods and nutraceuticals also appeared to have wide product lines, reflecting functional food and nutraceuticals only firms.

Table 28 Firms with functional foods and nutraceuticals products by targeted health aspects and development stage

	Functional foods in development	Functional foods on the market	Nutraceuticals in development	Nutraceuticals on the market
	number			
	Functional food firms		**Nutraceutical firms**	
Vascular or heart health	33	47	37	63
Diabetes	22	13	8	24
Cancer	11	17	19	14
Energy	23	34	21	58
Mental ability	7	7	20	47
Gut health	23	23	20	62
Immune system	9	19	42	65
Sports performance/ endurance	13	11	x	37
Bone health	14	19	19	58
Eye health	4	10	16	37
Weight control	22	21	16	40
Sexual performance	x	5 E	14	16
General nutrition	44	57	30	78
Other	9	4	17	18
	Firms active in both fields			
Vascular or heart health	23	10	19	18
Diabetes	19	3 E	10	10
Cancer	10	5	14	14
Energy	3 E	18	3 E	27
Mental ability	5 E	F	14	17
Gut health	20	12	28	22
Immune system	21	16	28	31
Sports performance/ endurance	5	19	x	22
Bone health	17	13	19	25
Eye health	9	0	13	21
Weight control	24	14	22	26
Sexual performance	x	3 E	8	22
General nutrition	26	30	23	40
Other	7	8	10	7
	Total for all firms			
Vascular or heart health	**56**	**57**	**56**	**82**
Diabetes	**41**	**16**	**18**	**34**
Cancer	**20**	**22**	**33**	**28**
Energy	**26**	**52**	**25**	**84**
Mental ability	**11**	**9**	**34**	**64**
Gut health	**43**	**36**	**48**	**85**
Immune system	**30**	**35**	**69**	**96**
Sports performance/ endurance	**18**	**30**	**16**	**58**
Bone health	**31**	**31**	**37**	**84**
Eye health	**14**	**10**	**29**	**58**
Weight control	**46**	**35**	**38**	**66**
Sexual performance	**5**	**8**	**22**	**38**
General nutrition	**70**	**86**	**53**	**118**
Other	**16**	**12**	**27**	**25**

Notes: Preliminary data, subject to revision. Total number of product lines may not sum up individual components due to rounding of estimates. Firms may have products in more than one area.

Source: Statistics Canada, The Functional Foods and Nutraceuticals Survey - 2005.

6.3 Raw Ingredients

The raw ingredients for FFN products come from different sources. For functional foods, nearly all raw ingredients were sourced domestically, with 45 firms indicating that they used oil seeds and 40 firms used grains and cereals (Table 29). Thirty-seven nutraceutical firms also used oil seeds, but a fifth used foreign seafood or marine products as an input, and nearly one third sourced herbs or spices from abroad. A quarter of dual product firms stated that they used domestically sourced fruits as an input, which is an ingredient source that did not appear to have the same importance to either nutraceutical or functional food only firms.

Foreign ingredients were relatively minor, but for nutraceutical products they appeared to be extremely important. While many oil seed and grain/cereal products are sourced within Canada, herbs and spices tended to be sourced from abroad.

Table 29 Firms indicating source of origin for ingredients

	Functional food firms		Nutraceutical firms		Firms selling both		**All firms**	
	Canadian	Foreign	Canadian	Foreign	Canadian	Foreign	**Canadian**	**Foreign**
	number							
Dairy products	19	6	15	6	15	18	**49**	**30**
Oil seeds	45	x	37	x	25	6	**107**	**20**
Meat and poultry, or other animal products	9	F	14	x	15	4	**37**	**19**
Seafood or marine species	8	0	24	37	11	9	**43**	**46**
Grains and cereals	40	F	15	13	30	12	**85**	**27**
Pulses and/or legumes	18	F	6	16	12	7	**36**	**25**
Fruits	17	F	11	20	23	9	**51**	**32**
Vegetables	16	F	3	10	17	8	**37**	**23**
Herbs or spices	5	3 E	28	56	18	37	**51**	**97**
Other	12	12	17	17	0	12	**29**	**40**

Notes: Preliminary data, subject to revision. Number of firms may not sum up individual components due to rounding of estimates. Firms may respond to multiple sources.
Source: Statistics Canada, The Functional Foods and Nutraceuticals Survey - 2005.

7. Summary

The functional foods and nutraceutical (FFN) sector represents an interesting area of food processing whereby foods are either enriched or processed so as to produce a product with increased health benefits, usually in the areas of general health, vascular health or energy. A total of 389 firms are estimated to be active in this field, with some firms only offering functional foods, some only nutraceuticals, and a smaller number offering both product lines.

Total revenues for this sector were $2.9 billion, of which over $500 million worth was exported, with the United States being the most popular destination of choice. Many firms, however, are exploring other markets beyond the United States, Japan or Korea.

A significant number of firms indicated a positive impact on domestic sales and on product development attributed to regulations and a lower impact on export sales and the ability to compete internationally. The ability to claim product specific benefits, however, was viewed favourably by the majority of firms sampled.

8. Methodology

Description
The objective of the survey is to provide information on the functional food and nutraceutical sector and a profile of firms engaged in functional food and/or nutraceutical related activities in Canada. Information from this survey may be used by businesses for economic or market analysis, by trade associations to study sector performance, by government departments and agencies to assist policy formulation, and by the academic community for research purposes.

Subjects
- Manufacturing
- Food industries

Target population
All firms participating in functional food and/or nutraceutical related activities (for the purpose of human consumption) in Canada, as identified by Agriculture and Agri-Food Canada, or firms that indicated they were involved in such activities in the 2005 Survey on Emerging Technologies.

Instrument design
The questionnaire was prepared in active co-operation with partners and in consultation with a group of functional food and nutraceutical experts offering a range of expertise and interests.

Sampling
This is a census survey with a cross-sectional design.

Agriculture and Agri-Food Canada provided the Science, Innovation and Electronic Information Division with a list of firms involved in functional food and nutraceutical related activities. The Science, Innovation and Electronic Information Division of Statistics Canada also provided a list of companies that had indicated they were involved in functional food and/or nutraceutical related activities in the 2005 Survey on Emerging Technologies. These two lists were merged and duplicate units were identified.

Data sources
Responding to this survey is compulsory. Data are collected directly from survey respondents.

Data were collected using a paper mail-out, mail-back questionnaire. Pre-contact was made by telephone prior to the mail-out. Follow-up was also conducted by telephone.

Error detection
Questionnaires were manually edited and outliers detected as they were received during collection. A series of edit rules were developed, and invalid or inconsistent entries were corrected using these rules. Follow-up was conducted for missing entries that could not be manually edited.

Imputation
Hot deck imputation was used to impute qualitative questions, and combined with ratios, to impute some quantitative questions. Thus, a donor was randomly selected within a receiver's imputation group when required. Imputation groups were based on question 1, and they had three possible values: functional foods only, nutraceuticals only and functional foods AND nutraceuticals.

Donor imputation was also used to impute quantitative questions. A donor is found based on a distance between it and the receiver. The donor with the smallest distance is selected. This is called the nearest neighbour method.

Estimation

All tables were produced with the Generalized Estimation System (GES) in Excel. Totals and proportions were estimated.

Quality evaluation
Data quality was evaluated on the basis of the quality standards in force at Statistics Canada, namely the standards for data relevance, accuracy, timeliness, accessibility and interpretability. Data quality was evaluated in co-operation with methodologists. In the event of poor quality, the data concerned are not published. Comparisons between the results from the 2002 and 2004 databases should be attributed to differences in the methodologies of the two surveys.

Disclosure control
Statistics Canada is prohibited by law from releasing any data that would divulge information obtained under the Statistics Act that relates to any identifiable person, business or organization without the prior knowledge or the consent in writing of that person, business or organization. Various confidentiality rules are applied to all data that are released or published to prevent the publication or disclosure of any information deemed confidential. If necessary, data are suppressed to prevent direct or residual disclosure of identifiable data.

Data accuracy
The data accuracy indicators used for the Functional Foods and Nutraceuticals Survey are the standard error and the coefficient of variation.

The standard error is a commonly used statistical measure indicating the sampling error of an estimate. The standard error and the coefficient of variation (standard error expressed as a percentage of the estimate) were used in the following statistical tables to provide an indication of the data quality level of the estimates. Please note that the coefficient of variation (CV) was not calculated for percentage tables.

Alphabetic symbols representing the size and range of the standard error and the CV were used in the statistical tables to provide an indication of the extent of the sampling error of the estimates. Some data with a higher standard error or CV (in the 'E' category) are precise enough for some purposes; however one should proceed with caution. The letter 'F' indicates that the estimate has a high standard error and was not published.

The response rate for this survey was 60%.

Catalogued publications

Science, Technology and Innovation statistical publications

88-001-XIE	Science statistics
88-003-XIE	Innovation analysis bulletin
88-202-XIE	Industrial research and development, intentions (with 2004 preliminary estimates and 2003 actual expenditures) (annual)
88-204-XIE	Federal scientific activities (annual)
88F0006XIE	Science, Innovation and Electronic Information Division working papers
88F0017MIE	Science, Innovation and Electronic Information Division research papers

88-001-X Volume 31 – 2007

No. 1 Research and development (R&D) personnel in Canada, 1995 to 2004 (January)

No. 2 Estimates of total spending on research and development (R&D) in the health field in Canada, 1989 to 2006 (March)

88-001-X Volume 30 – 2006

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